

AD-A048 353

FEDERAL COBOL COMPILER TESTING SERVICE WASHINGTON D C  
FORTRAN COMPILER VALIDATION SUMMARY REPORT.(U)  
DEC 77

F/G 9/2

UNCLASSIFIED

FCVS66-VSR260

NL

1 OF 1  
AD  
A048353



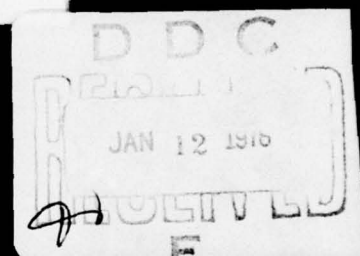
END  
DATE  
FILMED  
2-78  
DDC

AD A 048353

FEDERAL  
COBOL  
COMPILER  
TESTING  
SERVICE

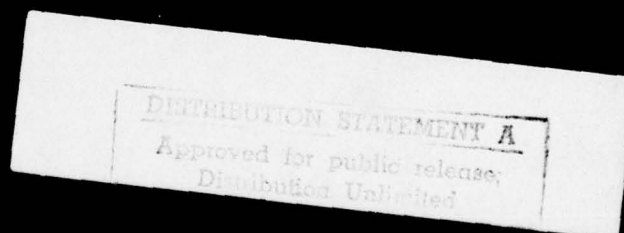


VALIDATION  
SUMMARY  
REPORT



Department of the Navy  
(ADPESO)

Washington, D.C.  
20376



F 26

10

6

**FORTTRAN COMPILER  
VALIDATION SUMMARY REPORT .**

FEETS/

11

30 Dec 77

12

18 P.

VALIDATION NUMBER FCVS66-VSR260

14

DDC  
JAN 12 1978  
F

Prepared By:

FEDERAL COBOL COMPILER TESTING SERVICE  
DEPARTMENT OF THE NAVY  
WASHINGTON, D.C. 20376

DISTRIBUTION STATEMENT A

Approved for public release;  
Distribution Unlimited

A

408 438

mt

<b>BIBLIOGRAPHIC DATA SHEET</b>		1. Report No. FCVS66-VSR260 ✓	2.	3. Recipient's Accession No.
4. Title and Subtitle Validation Summary Report # <u>FCVS66-VSR260</u> (Assigned by Manager <u>MVS FORTRAN IV H Extended</u> of Testing)			5. Report Date 30 Dec 1977	6.
7. Author(s) Same as organization - see 9.			8. Performing Organization Rept. No.	
9. Performing Organization Name and Address Federal COBOL Compiler Testing Service ADP Selection Office Department of the Navy Washington, D. C. 20376 ✓			10. Project/Task/Work Unit No.	
12. Sponsoring Organization Name and Address Automatic Data Processing Selection Office Department of the Navy Washington, D. C. 20376			11. Contract/Grant No.	
			13. Type of Report & Period Covered	
			14.	
15. Supplementary Notes				
16. Abstracts <p>           This Validation Summary Report (VSR) for the <u>IBM 370 series H Extended</u> FORTRAN Compiler Version <u>2.2</u> ( <u>MVS</u> Version <u>3.7</u>, JES 2 ) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1966 FORTRAN Standard (X3.9-1966). The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies; a section relating the categories of discrepancies to the language; and a detailed listing of discrepancies together with the tests which were failed.         </p>				
17. Key Words and Document Analysis. 17a. Descriptors				
Programming Languages Standards Compilers FORTRAN Verifying Proving Program Correctness Software Engineering:		SAMPLE Underlined information must be provided for each VSR released to NTIS.		
17b. Identifiers/Open-Ended Terms FCVS CVS				
17c. COSATI Field/Group 09/02				
18. Availability Statement Release unlimited		19. Security Class (This Report) UNCLASSIFIED		21. No. of Pages
		20. Security Class (This Page) UNCLASSIFIED		22. Price



# **FORTRAN COMPILER VALIDATION**

1. Validation Number	FCVS66-VSR260
2. Vendor	International Business Machines
3. Mainframe	IBM System 370/168
4. Compiler Identification	FORTRAN IV H Extended Level 2.2
5. Operating System Identification	MVS, Release 3.7, JES2
6. Compiler Validation System Version Number	FCVS66 1.2

\*PLEASE NOTE. The Department of the Navy may make full and free public disclosure of the Validation Summary Report (VSR) in accordance with the "Freedom of Information Act" (5 U.S.C. #552). The results of this validation are only for the purpose of satisfying United States Government requirements, and apply only to the Computer System, Operating System release, and compiler version identified in the VSR. The FORTRAN Compiler Validation System is used to determine, insofar as is practical, the degree to which the subject compiler conforms to American Standard FORTRAN, X3.9-1966. Thus, the VSR is necessarily discretionary and judgmental. The United States Government does not represent or warrant that the statements, or any one of them, set forth in the VSR are accurate or complete. The VSR is not meant to be used for the purpose of publicizing the findings summarized therein.

For information concerning this compiler you can contact the vendor's designated representative named below:

Jay Valentine  
Federal Support Center  
IBM Corporation  
10401 Fernwood Road  
Bethesda, Maryland 20034

ACCESS FOR	✓
NTIS	✓
DDC	<input type="checkbox"/>
UNANNOUNCED	<input type="checkbox"/>
JUSTICE	<input type="checkbox"/>
BY	
DISTRIBUTION/AVAILABILITY CODES	
SPECIAL	
A	

## TABLE OF CONTENTS

SECTION 1.	INTRODUCTION	1
1.1	Purpose of the Validation Summary Report	1
1.2	Preparation of the VSR	1
1.3	Organization of the VSR	1
1.4	Use of the VSR	1
1.5	Sources of Additional Information	2
SECTION 2.	DETAILED EVALUATION OF ERRORS	3
2.1	Syntactical Errors	4
2.2	Semantic Errors	4
SECTION 3.	SOFTWARE ENVIRONMENT	5
APPENDIX A -	VALIDATION SUMMARY WORKING DOCUMENT	7

## SECTION 1. INTRODUCTION

### 1.1 Purpose of the Validation Summary Report

The purpose of the Validation Summary Report (VSR) is to identify individual FORTRAN language elements whose implementation does not conform to the language specifications defined in American Standard FORTRAN, X3.9-1966.

### 1.2 Preparation of the VSR

The Validation Summary Report is prepared by analyzing the results of running the FORTRAN Compiler Validation System (FCVS). The FORTRAN Compiler Validation System consists of audit routines containing features of American Standard FORTRAN, their related data, and an Executive Routine which prepares the audit routines for compilation. Each audit routine is a FORTRAN program which includes many tests and supporting procedures indicating the result of the tests.

The testing of a compiler in a particular hardware/operating system environment is accomplished by compiling and executing each audit routine. The report produced by each routine tells whether the compiler passed or failed the tests in the routine. If the compiler rejects some language elements by terminating compilation, giving fatal diagnostic messages, or terminating execution abnormally, then the test containing the code the compiler was unable to process is deleted. The audit routine is compiled again and execution is repeated.

The compilation listings and the output reports of the audit routines constitute the raw data from which the members of the Federal COBOL Compiler Testing Service produce a Validation Summary Report.

### 1.3 Organization of the VSR

The Validation Summary Report is made up of several sections whose contents are described below.

a. Section 2 summarizes the results of the compilation and execution of the programs comprising the FORTRAN Compiler Validation System. Section 2 is divided into a subsection describing the syntax errors encountered while compiling the FORTRAN audit routines, and a subsection describing the semantic errors which occurred during execution of the FORTRAN audit routines.

b. Section 3 contains information which describes the software environment in which the compiler was tested. This includes the name and version of the operating system and the logical unit/physical device assignments used in the programs comprising the FCVS. The options used with the compiler are also given, and if applicable, the use of compiler optimization features is explained.

c. Appendix A is the Validation Summary Working Document, a working paper resulting from the compilation and execution of the FCVS. The VSR is derived from Appendix A.

### 1.4. Use of the VSR

The Department of the Navy may make full and free public disclosure of the



Validation Summary Report (VSR) in accordance with the "Freedom of Information Act" (5 U.S.C. #552). The results of the validation are only for the purposes of satisfying United States Government requirements, and apply only to the computer system, operating system release, and compiler version identified in the VSR.

The FORTRAN Compiler Validation System is used to determine, insofar as is practical, the degree to which the subject compiler conforms to the FORTRAN Standard. Thus, the VSR is necessarily discretionary and judgmental. The United States Government does not represent or warrant that the statements, or any one of them, set forth in the VSR are accurate or complete. The VSR is not meant to be used for the purpose of publicizing the findings summarized therein.

#### 1.5 Sources of Additional Information

The detailed FORTRAN language specifications are given in the publication "American Standard FORTRAN, X3.9-1966", available from the American National Standards Institute, 1430 Broadway, New York, New York 10018.

An explanation of the FORTRAN Compiler Validation System is contained in the FCVS User's Guide. This document explains how to run the compiler validation system. The User's Guide and a magnetic tape containing a copy of the FCVS programs are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia, 22151. (Ordering information can be obtained from the Federal COBOL Compiler Testing Service.)



## SECTION 2. DETAILED EVALUATION OF ERRORS.

This section summarizes the results of the compilation and execution of the programs comprising the FORTRAN Compiler Validation System (FCVS). The version of the FCVS used during this validation is shown inside the front cover of the VSR.

Section 2 is made up of two subsections. The first subsection describes each syntax error encountered during compilation of the audit routines, and the second subsection describes the semantic errors encountered during execution of the audit routines.

Each error or deviation noted in this section makes reference to a program contained in Appendix A (Validation Summary Working Document). This reference provides the documented results of an occurrence of errors/deviations detected during the running of the FCVS using the compiler within the environment identified in this document. The Validation Summary Working Document is presented in sequence by program number.

## 2.1 Syntactical Errors

- 2.1.1 The compiler rejected the definition of a statement function in which the dummy arguments did not appear in the expression portion of the definition. See FM020.

X3.9-1966 References: Section 8.1, Statement Functions

## 2.2 Semantic Errors

No errors.

### SECTION 3. SOFTWARE ENVIRONMENT.

The compiler referenced in this document was validated using the software environment described in this section. When using a modification of the described environment, the compiler may or may not continue to conform to the Standard. It should be noted that during the validation process, an attempt is made to validate as many different options as possible.

The use of compiler options, logical unit/physical device assignments, and any form of optimization which is not described in this report could cause the compiler to produce a program that does not perform according to the specifications of Standard FORTRAN. Only the environment described in this document has been used with this compiler to satisfy the validation requirements of the Department of the Navy.

#### 1. Options or parameters used on the processor call statement for the compiler.

Options specified:

##### a. Batch - Without Optimization.

```
//XEQFT  EXEC FORTXCLG
//      PARM.FORT='BCD,LOAD,SOURCE,NODECK,NOLIST,SIZE(MAX),OPT(0)'
```

Even though the 'BCD' option was specified on the FORTRAN call statement this compiler generated the source listing before it performed the actual character code conversion. All conversion was performed successfully with the exception that the special characters "=+()" were not converted when contained within comment lines, within the Hollerith constants of data initialization statements, and within the Hollerith field descriptors of the FORMAT statements.

##### b. Batch - With Optimization.

```
//XEQFT  EXEC FORTXCLG
//      PARM.FORT='BCD,LOAD,SOURCE,NODECK,NOLIST,SIZE(MAX),OPT(2)'
```

Even though the 'BCD' option was specified on the FORTRAN call statement this compiler generated the source listing before it performed the actual character code conversion. All conversion was performed successfully with the exception that the special characters "=+()" were not converted when contained within comment lines, within the Hollerith constants of data initialization statements, and within the Hollerith field descriptors of the FORMAT statements.

##### c. Time-sharing.

The time-sharing processing mode was not used to validate this compiler.

#### 2. Logical Unit/Physical Device Assignments.

##### a. Batch Compiler Runs.



Printer Destined Files:

Logical unit 06 was assigned to SYSOUT=\*

Tape Files:

Logical unit 08 was assigned to a tape file by using the following JCL card.

//FT08F001 DD UNIT=TAPEHI,VOL=SER=JBJ101,DSN=XXX

Sequential Mass-storage Files:

Logical unit 08 was assigned to a mass-storage file by using the following JCL card.

//FT08F001 DD DSN=XXXX,UNIT=V3330,SPACE=(CYL,5)

Card Input Files:

Logical unit 05 was assigned to the card reader. The following JCL card preceeds the audit routine when using the card reader.

//FT05F001 DD \*

b. Time-sharing Compiler Runs.

The time-sharing mode was not used to validate this compiler.

3. Optimization. The compiler may or may not have optimization features. If there was an optimization feature available, it was used during the validation process (during a separate execution of the Compiler Validation System) to determine if its use causes the compiler to produce a program which does not give the expected results. If the optimization is invoked through the compiler call statement then it is mentioned in paragraph 1 above. If it is invoked through the introduction of a compiler directing source program statement, it is shown below. Optimization which would require modification to source program statements is not considered in this report in that it is beyond the scope of the use of Standard FORTRAN and the validation process.

The optimization feature for this compiler is invoked through the compiler call statement. See 1. above.

4. Compiler.

FORTTRAN IV H Extended, Level 2.2

5. Operating system.

MVS, Release 3.7, JES2

## APPENDIX A

### VALIDATION SUMMARY WORKING DOCUMENT

This appendix is a working paper produced during the validation and documents the results of the compilation and execution of each of the programs comprising the FCVS. The results contained herein are based on the use of the compiler within the Validation Environment identified in this appendix. This appendix (Validation Summary Working Document) is not part of the official Validation Summary Report (VSR), and it is not intended to reflect in any way the compiler's usefulness or degree of conformance to the language specifications.

The reader of this appendix should keep in mind that the same problem area may appear in more than one program but is considered only as a single discrepancy, and the problem is reflected only once in the body of the VSR. (The VSR will in turn only reference the first occurrence of the problem in the appendix.)

This appendix is divided into four parts. The first part describes the Validation Environment. The second part lists the Monitor Input Cards used in creating a job control stream for execution in the batch mode. The third part shows the control cards required to compile and execute an individual program. The fourth part of the document is divided into two categories of information: compilation results and execution results. Information items, such as compiler warning messages, are included in the summary of compilation and execution results.

The reference document for FORTRAN is American Standard FORTRAN, X3.9-1966.

## VALIDATION ENVIRONMENT

COMPILER IDENTIFICATION:	FORTRAN IV H Extended, Level 2.2
COMPUTER SYSTEM:	IBM SYSTEM 370/168
OPERATING SYSTEM:	MVS, Release 3.7, JES2

Each of the programs comprising the FCVS was compiled and executed twice in the batch mode. First, the programs were compiled and executed without the compiler optimization feature, and then the programs were compiled and executed with the compiler optimization feature requested. In addition, the programs which test I/O, FM100 through FM108, were run both with and without optimization. The programs were first run with the output logical unit assigned to a tape device, and then rerun with the unit assigned to a mass-storage device.



### FCVS EXECUTIVE ROUTINE CONTROL CARDS

The FCVS Executive Routine was used to prepare the FCVS programs for execution in the batch mode. The Control Cards used as input to the FCVS Executive Routine together with the job control stream for executing the Executive Routine are listed below:

```
//JB1HN00 JOB 3POA069K00060J,'VALENTINE',  
//          MSGLEVEL=(0,0),NOTIFY=JPJ1,MSGCLASS=A,CLASS=B  
//JOB LIB DD DSN=J1F.NAVYLINK,DISP=SHR  
//XEQEXEC EXEC PGM=AS001  
//FT06F001 DD SYSOUT=*  
//FT07F001 DD DSN=JB1.NAVYSOUR.CNTL,DISP=SHR  
//FT08F001 DD DSN=&&OUT,DISP=(,PASS),UNIT=V3330,SPACE=(CYL,(1,1))  
//FT09F001 DD DSN=JB1.FM015INP,DISP=SHR  
//FT05F001 DD *
```

(FORTRAN audit routine selection cards)

```
X-060 I06 = 8  
X-070 I07 = 8  
X-080 I08 = 8  
X-090 I09 = 8  
X-100 I10 = 8  
X-110 I11 = 8  
X-120 I12 = 8  
*LIST U  
*END-MONITOR  
*BEGIN-UPDATE  
*START,FM020  
=00250C00250  
=00320C00320  
=00350C00350  
=01410C01420  
=01660C01680  
*END-UPDATE  
*END-INPUT  
/*  
//
```

## CONTROL CARDS FOR RUNNING FCVS PROGRAMS

The job control stream for an individual program consisted of the following control cards:

```
//JBJ1HN00 JOB 3POA069K00060J,'VALENTINE',  
//          MSGLEVEL=(0,0),NOTIFY=JBJ1,MSGCLASS=A,CLASS=B  
//JOB LIB   DD DSN=J1F.NAVYLINK,DISP=SHR  
//XEQFT     EXEC FORTXCLG  
//          PARM.FORT='BCD,LOAD,SOURCE,NODECK,NOLIST,SIZE(MAX),OPT(0)'  
//FORT.SYS PRINT DD SYSOUT=*  
//FORT.SYS IN  DD DSN=&&OUT,DISP=(CLD,DELETE)
```

(audit routine source program)

```
//LKED.SYS PRINT DD SYSOUT=A  
//GO.FT06F001 DD SYSOUT=*  
//GO.FT08F001 DD DSN=XXX,UNIT=TAPEHI,VOL=SER=JBJ101  
//GO.SYS IN    DD *  
0123456789ABCDEFGHIJKLMN0PQRSTUVWXYZ =+-*/(),..$  
/*  
//
```

## RUN SUMMARIES

### FM001 through FM014

#### A. Compilation

No errors.

#### B. Execution

No errors.

### FM015

#### A. Compilation

With the 'BCD' option specified on the FORTRAN compiler call statement, four special characters '=+()' were not converted within the Hollerith constants of the data initialization statements and the Hollerith field descriptors of the FORMAT statements. In addition, the same special characters were not converted within Comment Lines.

#### B. Execution

FM015 executed correctly when the data being read from the system input device and the data to which it was compared within the program were consistent in format and actual physical representation (i.e., either both converted or both unconverted).

### FM016 through FM019

#### A. Compilation

No errors.

#### B. Execution

No errors.

### FM020

#### A. Compilation

The FORTRAN statements

IFON01(IDON01) = 32767  
LFTN01(LDTN01) = .TRUE.

in Tests 553 and 554 caused the compiler to generate the fatal message

ISN --- IFE229I 8(E) ALL THE ARGUMENTS OF AN ARITHMETIC STATEMENT  
FUNCTION ARE NOT USED IN THE DEFINITION.

The compiler aborted with a severity code equal to 8. After the flagged statements and Tests 553 and 554 were deleted the updated program



compiled correctly.

B. Execution

No errors.

FM021 through FM045

A. Compilation

No errors.

B. Execution

No errors.

FM050 through FM062, FM080 through FM083, and FM097 through FM099

A. Compilation

No errors.

B. Execution

No errors.

#### **FORTTRAN I/O Routines - FM100 through FM108**

These audit routines were executed with the output logical unit assigned to a tape device and rerun with the output logical unit assigned to a mass-storage device.

#### **FM100 through FM108**

##### **A. Compilation**

No errors.

##### **B. Execution**

No errors.

#### **FM109**

##### **A. Compilation**

With the 'BCD' option specified on the FORTRAN compiler call statement, the special character + (plus) was not converted when used with the Hollerith field descriptor of a FORMAT statement.

##### **B. Execution**

FM109 executed correctly when the plus (+) characters in the Hollerith field descriptors of the FORMAT statement were properly converted.